



# Transmittal

<b>Date:</b>	3 November 2009	<b>Number of Pages (incl. cover):</b>	6	
<b>To:</b>	Mr. Robert Kendrick BP Barber Inc. 5900 Northwoods Business Pky., Suite O Charlotte NC 28269	<b>Tel. Number:</b>	704-926-0981	
		<b>Fax Number:</b>	704-926-0982	
<b>Copies to:</b>		<b>Tel. Number:</b>		
		<b>Fax Number:</b>		
<b>Project:</b>	Landfill Expansion III, North Mecklenburg C&D Landfill, Inc., Mecklenburg County, NC			
<b>From:</b>	Bryan Strohman	<b>Project Number:</b>	090206	
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## Comments:

Robert:

Enclosed please find pipe installation details, pipe specifications, and a pipe maintenance program for the 36 in. diameter HDPE deep burial pipe design for Landfill Expansion III, North Mecklenburg C&D Landfill, Inc., Mecklenburg County, NC. Please call me with any questions at 781-907-9396. Thank you.

Regards,  
Bryan

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**36 in. Diameter Corrugated HDPE Pipe Design**Engineering of Structures  
and Building Enclosures**Project No.: 090206****Project:** Landfill Expansion III, North Mecklenburg  
C&D Landfill, Inc., Mecklenburg County, North Carolina**Date:** 3 November 2009**Pipe Data, provided by Advanced Drainage Systems (ADS), Inc.:**

Pipe standard

AASHTO M294

Inside diameter, in.

36

Outside diameter, in.

41.1

Corrugated rib profile/properties:

Cross-sectional area, in.<sup>2</sup>/in.

0.403

Moment of Inertia, in.<sup>4</sup>/in.

0.318

Distance from inside diameter to neutral axis, in.

1.07

Period of profile, in.

5.20

Height of profile, in.

2.54

**HDPE Material Design Properties (AASHTO LRFD Bridge Design Specifications (4th Ed.):**

Short term modulus of elasticity, ksi

110

Long term modulus of elasticity, ksi

22

Compressive limiting strain

0.0409

**Design Data, provided by BP Barber, Inc.:**

Total fill height, ft

150

Embankment trash density, pcf

60

This design is based solely on soils data provided by BP Barber and analysis of the pipe behavior for circumferential effects. Design for control of differential longitudinal settlement and other sources of longitudinal stress to prevent damage to the pipe by others.

**Backfill Data:**

Backfill and flowable fill density, pcf

120

Primary backfill around pipe:

Flowable fill, 28 day compressive strength, psi

500 - 1,000

Flowable fill, flow consistency per ASTM D 6103, in.

9

Backfill at sides of flowable fill (sidefill):

USCS (ASTM D 2487) classification

SW, GW, or GP

Minimum density, % of maximum per ASTM D 698

95





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Uncompacted zone material:

See Project Specifications

Note: ASTM D 2487 materials GC, SC, CL or SM are acceptable.

Dimensions and additional installation criteria

See Sheet SK-1

**Materials:**

1. The 36 in. diameter drain pipes shall be N-12 WT IB pipe per AASHTO M294 manufactured by Advanced Drainage Systems, Inc., Hilliard, OH, or approved equal. The pipe shall have a reinforced bell with a bell tolerance device installed by ADS.
2. The pipe joints shall be watertight in accordance with the requirements of ASTM D 3212.
3. Gaskets shall be supplied by ADS and covered with a removable, protective wrap until just before joint assembly to ensure the gasket is free from debris. A joint lubricant available from ADS shall be applied to the gasket and bell just prior to joint assembly.
4. Flowable fill mix shall consist of cement, sand, fly ash, and water and shall meet the material requirements of this specification (see Sheet 1). Large quantities of entrained air shall not be permitted. Coarse aggregate may also be used, provided material requirements are met.
5. Submit mix design for flowable fill and procedures for anchoring pipe against flotation and other movement during placement of the flowable fill.

**Pipe Installation Sequence:**

1. The contractor shall submit a plan for all sequences and procedures to be used for placing and backfilling the pipe. No pipe or backfill may be placed prior to receiving the engineer's approval of the backfilling plan. General issues that the backfill plan should address are included below.
2. The contractor is responsible for assuring that all applicable safety standards are complied with in all aspects of the pipe and backfill installation.
3. Pipe shall be installed as indicated on Sheet SK-1.
4. Prepare native soil to allow placement of pipe and flowable fill on a uniform firm surface. No rocks or clumps larger than 1 in. shall be in the bedding beneath the pipe for a minimum depth of 3 in. If native material is determined to be unsuitable by the Engineer, remove to a depth of 6 in. for the full width of the flowable fill zone and replace with the





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material specified for sidefill and compact to 95% of maximum standard Proctor density, except the material directly beneath the pipe shall be uncompacted; see Step 5.

5. Loosen soil directly under invert of pipe for a width of one-third of the diameter to a depth of 3 in.; see Sheet SK-1.
6. The bottom of the trench excavation shall be kept dry and free of water during preparation of the bedding, installation of the pipe, and installation of the flowable fill.
7. Install pipe and complete joints in accordance with ASTM D 2321 and ADS installation recommendations.
8. Install sidefill and backfill as follows:
  - Place specified sidefill material and flowable fill material around and at sides of pipe.
  - For ease of construction, sidefill and flowable fill may be placed incrementally, i.e., 2 to 3 ft of sidefill material may be placed and compacted (in suitable lift thicknesses to allow compaction to specified level) followed by placement of flowable fill. Alternatively, the contractor may place and compact all sidefill material prior to installing the pipe. The contractor shall submit details of the placing procedures and confirm that the required compaction is achieved for the full height of the sidefill.
  - The flowable fill shall be installed in equal lifts on both sides of and in between the pipe to prevent eccentric loading.
  - Visually monitor the placement of sidefill material. Conduct field density tests at locations and frequency directed by the Engineer.
  - The contractor is responsible for anchoring pipe to resist flotation or other movements while placing flowable fill. Anchoring system must not damage pipe.
  - Pipe shall be thoroughly cleaned and free of foreign matter prior to installation of flowable fill.
  - Place uncompacted embankment material from top of flowable fill to depths and widths shown on Sheet SK-1.



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- After placing flowable fill, inspect pipe and measure vertical diameter at a minimum of 50 ft intervals along pipeline. Report deflections and any other observations to the engineer.
  - If approved by the Engineer, proceed with placement of embankment material, compacting per project specifications.
  - After completion of backfill, inspect pipe and re-measure vertical diameter at a minimum of 50 ft intervals along pipeline. Record pipe conditions. Provide a report of deflections and observed pipe conditions to engineer.
9. Connection of the pipe with existing or new structures shall be in accordance with ADS installation recommendations.
10. Upon completion the contractor is responsible for removal of any materials from inside the pipe, including any flowable fill that enters the pipe.
11. A curved pipe alignment may be installed in accordance with ADS maximum allowable pipe bend angle (lateral joint rotation); see ADS corrugated HDPE pipe installation guide. If the proposed pipe alignment exceeds the maximum allowable pipe bend angle, coupling bands, manufactured by ADS may be used to accommodate the curvature. The proposed curved pipe alignment and coupling bands shall be submitted to the engineer for approval prior to manufacturing or installing the pipe.



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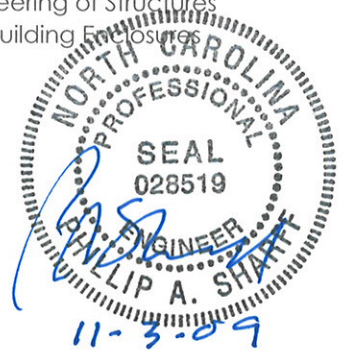
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**Pipe Maintenance Program:**

1. The pipe shall be maintained clear of all debris and inspected periodically for joint leakage or deformation.
2. Inspection of the piping system shall be performed a minimum of once every five years or after major rain events if debris has accumulated in the pipe. The inspection shall include entry into the piping system by either man entry or using closed circuit television (CCTV) to identify signs of structural distress and/or soil/water infiltration. If structural distress or infiltration is observed a licensed professional engineer should be contacted to evaluate the piping system. Man entry shall only be performed by certified confined space entry personnel.
3. Prior to inspection and maintenance, the piping system shall be thoroughly cleaned by either manual methods or by using a vacuum truck to remove sediment build up. Cleaning shall be performed at the discretion of the individuals responsible for maintenance of the system, but should be scheduled during a dry season. Cleaning shall be performed a minimum of once per year.



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